

A Preliminary Report on the Status of Sugar Gliders *Petaurus breviceps* (Waterhouse) Reintroduced into Blackburn Lake Sanctuary, Victoria.

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Abstract

In 1984-5, as part of a re-introduction programme, 43 Sugar Gliders *Petaurus breviceps* were released into Blackburn Lake Sanctuary, a suburban forest remnant in Melbourne, Victoria. Prior to this study the success of the re-introduction was uncertain. The status of the Sugar Glider in Blackburn Lake Sanctuary was examined during 1990 by trapping, spotlighting, hair-sampling and the examination of nestboxes over a six month period. Sugar Gliders were not detected in the Sanctuary. The integrity of the various survey methods used is questionable. Possible reasons for the apparent failure of the re-introduction are considered. The failure has implications for the survival of natural populations in similar areas, and for the outcome of similar reintroductions.

Introduction

In 1984-5, 43 captive-bred Sugar Gliders *Petaurus breviceps* were released into Blackburn Lake Sanctuary, a suburban forest isolate (D. Hackett, personal communication). This programme aimed to re-establish a population of Sugar Gliders in the sanctuary after the original naturally occurring population reportedly died out in the early 1970's (J. Wallbrink, *Eastern Standard*, May 15, 1984). Because nesting hollows were thought to be scarce, 32 nestboxes were placed throughout the sanctuary. Two fatalities have been recorded since the re-introduction (J. Wallbrink, unpublished note).

In April 1988, the Department of Conservation, Forests and Lands concluded that the gliders were not thriving within the sanctuary, as only one animal was captured during a follow-up study (letter to D. Hackett from the Department

of Conservation, Forests and Lands). The methodology employed, which consisted only of trapping and checking nestboxes, along with reports of sightings by local residents during late 1988-90 (B.Hansen, Blackburn Lake Sanctuary committee of management, pers. comm.) prompted us to consider that the C.F.L. survey may have failed to detect a surviving population of Sugar Gliders within the sanctuary.

Re-introduction programmes involving this species are not new. Suckling and Macfarlane (1983) and Suckling and Goldstraw (1989) document a successful Sugar Glider re-introduction in 1979-81 at Tower Hill, Victoria. As the population had not only persisted for eight years, but was also bigger in 1986 than in 1981, it was concluded that the reintroduction had been a success (Suckling and Goldstraw 1989). Given the success of this re-introduction programme, the population status of the Sugar Glider in Blackburn Lake Sanctuary is of considerable interest.

Materials and Methods

The status of the Sugar Glider in Blackburn Lake Sanctuary was examined during the winter and spring of 1990.

Study site

Blackburn Lake Sanctuary is a 25 ha reserve located in Blackburn, Victoria (37°40'S, 145°0'E). Primarily used for recreation, the reserve is located within a suburban area surrounded on all sides by large main roads. Several smaller isolates of re-planted and remnant forest occur outside the Sanctuary boundaries, but within the region delimited by main roads.

The vegetation of the Sanctuary consists of a sparse overstorey of eucalypts and wattles. These include *Eucalyptus viminalis* (Mauna Gum), *E.radiata* (Narrow-leaved

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Peppermint), *E.ovata* (Swamp Gum), *E.gonoicalyx* (Long-leaved Box), *E.obliqua* (Messmate), *Acacia mearnsii* (Late Black Wattle), *A.pycnantha* (Golden Wattle), *A.dealbata* (Silver Wattle), *A.baileyana* (Cootamundra Wattle), *A.longifolia* (Sallow Wattle) and *A.melanoxylo*n (Blackwood). The understorey is dense and relatively tall (2-4 metres). Dominant species include *Bursaria spinosa* (Prickly Bursaria), *Hakea sericea* (Bushy Needlewood), *Leptospermum* (Tea-tree) sp. and *Melaleuca* (Paperbark) sp.

Nestboxes

Thirty-two nestboxes were located within the reserve. Nestboxes were subsequently examined in July 1990 for the presence of Sugar Gliders or signs of their occupancy. Sugar Gliders weave green eucalypt leaves into a hollow ball up to 25 cm in diameter and cover the entrance with leaves in cold weather (Triggs 1984, p. 59). Owing to the absence of a removable lid, each box was inspected through the front entrance hole using a torch and a dental mirror attached to a 300mm long adjustable handle. The use of a stick to move nesting material and manipulation of the dental mirror enabled a thorough examination of the nestboxes. Eight of the boxes could not be reached, while four boxes were occupied by bees.

Hair Sampling and Analysis

Double-sided adhesive tape ('Supertape', No. 605, supplied by John Danks and Son, Pty. Ltd., Braeside, Melbourne) was placed around the entrance hole of all accessible nestboxes to obtain hair samples of the animals using them.

Hair samples were also collected in August/September 1990 using baited plastic tubes (10 cm x 3 cm) lined with double-sided adhesive tape (Suckling 1978). Bait consisted of peanut butter, honey and rolled oats. Sixty tubes were distributed randomly throughout the Sanctuary. Tubes were attached to a variety of *Eucalyptus* and *Acacia* trees at heights ranging 2-4m above the ground. All tubes were removed after 6 days.

Hairs obtained from the nestboxes and hairsampling tubes were mounted whole in water, and observed under x100 magnification using a compound microscope. Initially, transverse sections were prepared by hand following the method of Brunner and Coman (1974). However, most hairs were lost using this method, so the remaining hairs were embedded in resin and sectioned using a microtome. Hairs were identified using Brunner and Coman (1974).

Spotlighting

A total of nine hours spotlighting by two experienced observers was carried out on foot using two 30 watt spotlights. The spotlighting route was confined to the pathways extending throughout the Sanctuary. The entire reserve was surveyed at least once using this technique.

Trapping

Aluminium Elliot traps, 30cm x 10cm x 10cm (Elliot Scientific Co., Upwey, Melbourne) were set 2-3m above the ground in a variety of *Eucalyptus* and *Acacia* trees. Traps were either tied to horizontal branches or attached to trunks using wooden trap stands.

The traps were wrapped in plastic bags and baited with a mixture of honey, peanut butter and rolled oats. A dilute mixture of honey and water was sprayed over the traps and on surrounding branches. Thirty traps were set throughout the reserve during September 1990. A total of 140 trap nights were spread over 5 consecutive nights.

Newspaper article

An article describing the background and aims of the survey was published in the *Nunawading Gazette*, 5th September, 1990. This included a description of the Sugar Glider and a request for any information on Sugar Gliders in the area to be forwarded to the authors.

Results

Sugar Gliders were not detected in Blackburn Lake Sanctuary during this survey.

All nestboxes were found to contain a mixture of leaves, small branches, plastic bags and feathers. No small animals were found within the nestboxes with the exception of a Ringtail Possum *Pseudochierus peregrinus*, in one of the nestboxes.

Analysis of the adhesive tape placed around the entrance holes of the nest boxes revealed only fibres from feathers. The hair sampling tubes yielded hair samples from the genus *Rattus*. In addition, one hair sample was identified as belonging to a possum or glider, however, further identification to species level was not possible.

During nine hours of spotlighting, Common Brushtail Possums *Trichosurus vulpecula*, Ringtail Possums *P. peregrinus* and a rat *Rattus* sp. were the only arboreal mammals observed.

Two Indian Mynas *Acridotheres tristis* were the only animals trapped, although several traps were sprung without captures.

Public response to the newspaper article revealed only one likely sighting of a Sugar Glider, near the corner of Blackburn Road and Bindy Street (1.2km south of the sanctuary) in mid-1989.

Discussion

Previous surveys of Sugar Gliders in Blackburn Lake Sanctuary have only used two methods. In this study, four methods were used, yet Sugar Gliders remain undetected in the reserve. However, it cannot unequivocally be concluded that the Sugar Gliders released into the reserve in 1984-85 have died out. Instead, the results must be evaluated in context of the methods employed and their effectiveness. The value of the various methods used will be discussed.

Spotlighting

Spotlighting is an accepted technique used by naturalists and researchers to detect the presence of Sugar Gliders (Davey 1990). Thus, the lack of positive sightings of *P. breviceps* would seem to add support to the conclusion that Sugar Gliders are not present in the reserve, or are present

in numbers too low to allow detection using this technique.

Hair sampling

Evaluation of this technique by Suckling (1978) showed that, although this method is successful in detecting the presence of Sugar Gliders, it is only "about as successful as spotlighting for the detection of *P. breviceps*" (p. 249). Thus, the effectiveness of this method as a surveying tool may be limited. Furthermore, it was observed in this study that the adhesive properties of the tape were significantly reduced after a period of six days, particularly if it had been raining during this time. Thus, modifications of the tube design, similar to that suggested by Scotts and Craig (1986) may be desirable in future studies.

Trapping

In an extensive study concerned with assessing the effectiveness of trapping as a method for detecting Sugar Gliders, Smith and Phillips (1984) showed that trapping success is highly seasonally dependant. This was attributed to changes in the number of animals known to be alive throughout different seasons. Thus the lack of success in detecting Sugar Gliders in the sanctuary using trapping may not be indicative of the population status of the Sugar Glider in the reserve. This might be particularly true for low density populations of Sugar Gliders. Nonetheless, we consider that the more intensive trapping effort of this study made it a more thorough and hence more conclusive survey than that carried out in 1988 by the Department of Conservation, Forests and Lands. Interestingly, B. Traill (pers. comm.) notes that trapping success of Sugar Gliders is generally higher in times of low food availability.

Given that there was no winter flowering during the period of trapping in this study (pers. obs.), the lack of captures of *P. breviceps* is indicative of an absence or very low population level of *P. breviceps* in Blackburn Lake Sanctuary.

Possible factors affecting the suitability of Blackburn Lake Sanctuary to support a population of Sugar Gliders

The absence of Sugar Gliders from nestboxes within the sanctuary, while indicating a lack of gliders, may also suggest the gliders either prefer natural hollows for nest sites, or are being excluded by larger animals. Nestboxes of the same design are used by Sugar Gliders at Tower Hill State Game Reserve (Vic.) (Suckling and MacFarlane 1983). However, the absence of natural hollows at this site may preclude any preference gliders may show when alternate nest sites are available. In addition, the dimensions of the nestboxes installed in the sanctuary may permit the access of larger competitors, resulting in the exclusion of Sugar Gliders. The observation of a Common Ringtail Possum within a nest box demonstrated that the entrance hole of the boxes were sufficiently large to allow colonization by arboreal mammals larger than Sugar Gliders. Indeed, Menkhorst (1984) has noted a preference by Sugar Gliders for nest boxes with entrance holes which provide a tight fit, presumably to exclude larger species. Thus the absence of Sugar Gliders from nestboxes could be attributed to a number of factors.

Smith and Lindenmayer (1988) demonstrated the dependence of possums and gliders on the availability of potential nesting trees (PNT's). They further showed that for Leadbeater's Possum *Gymnobelideus leadbeateri*, a minimum density of PNT's may be reached (4.2 PNT's per 3 ha.) below which Leadbeater's Possum does not exist in the forest. Due to limited time, the density of PNT's suitable for Sugar Gliders in Blackburn Lake Sanctuary was not examined.

The diet of the Sugar Glider includes nectar, gum and sap as well as insects (Smith 1982). Food resources available to Sugar Gliders within the reserve were qualitatively assessed. Dominant tree species include Swamp Gum *Eucalyptus ovata*, Manna Gum *E.viminalis* and Narrow-leaved Peppermint *E.radiata*, associated with Black wattle *Acacia*

mearnsii and Silver wattle *A.dealbata*, all of which are known to be used as food trees by Sugar Gliders (Smith 1980, Kavanagh 1984). Thus it would appear that food is not a limiting resource for the Sugar Glider in Blackburn Lake Sanctuary.

Perhaps the most important factor accounting for the demise of the reintroduced Sugar Gliders is predation by native and feral animals (Suckling 1984). Feral and domestic cats, foxes and dogs have been seen within the reserve (B. Hansen, pers. comm., and personal observation) and may constitute a considerable barrier to the successful reintroduction of Sugar Gliders within Blackburn Lake Sanctuary (Brunner *et al.* 1975, Brunner *et al.* 1991).

The absence of Sugar Gliders in Blackburn Lake Sanctuary may be due to dispersal of the released animals rather than factors leading to mortality. However, the sanctuary is located in a region surrounded on all sides by large main roads which may provide a considerable barrier to the dispersal of this species out of the immediate area. Nonetheless, it is possible that the animals released into the sanctuary have dispersed to other forested isolates within the area delineated by these roads. Further work is needed to investigate this hypothesis.

Conclusions

The apparent failure of the reintroduction of Sugar Gliders into Blackburn Lake Sanctuary has important implications for the success of future reintroduction programmes for native fauna, particularly in suburban areas, and also for the survival of natural populations in forest remnants. Suckling (1980) has suggested that the minimum viable size of a reserve for the conservation of Sugar Gliders and associated mammals is 2000ha. This conclusion was reached after studying a collection of fragmented habitats which were characterized by abundant food resources. Blackburn Lake Sanctuary covers a considerably smaller area. Given the extensive residential development surrounding the sanctuary, the pressure of

predation by domestic and feral animals is probably higher. Thus the absence of Sugar Gliders from Blackburn Lake Sanctuary may not be very surprising, although the results of the study must be interpreted with caution.

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